

A trans-Atlantic record of the fossil tropicbird *Heliadornis ashbyi* (Aves: Phaethontidae) from the Miocene of Belgium

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Abstract.—The fossil tropicbird *Heliadornis ashbyi* Olson, previously known from the unique holotype from the middle Miocene Calvert Formation of Maryland, is here recorded from a contemporaneous site in Belgium based on a nearly complete humerus. Its trans-Atlantic occurrence at a much higher latitude suggests that *Heliadornis* may have been the higher-latitude sister group of the extant tropical genus *Phaethon*, much as within the Sulidae gannets of the genus *Morus* are the higher latitude counterparts of the tropical boobies of the genus *Sula*.

The three living species of tropicbirds (*Phaethon*, Phaethontidae) are remnants of an ancient and aberrant group that have almost always been allied with the Pelecaniformes. The best-preserved fossil associated with this group is *Prophaethon shrubsolei* Andrews (1899), from the early Eocene London Clay. This was shown to be so different from modern tropicbirds as to merit its own family, Prophaethontidae (Harrison & Walker 1976). Other very fragmentary unnamed remains of early Tertiary birds resembling tropicbirds have been reported (e.g., Olson 1994), but it is uncertain to which of the two families these may belong.

Apart from Quaternary records of extant species, the first certain fossil record of the Phaethontidae proper was based on three associated bones from the middle Miocene Calvert Formation of Maryland that were described as a new genus and species, *Heliadornis ashbyi* (Olson 1985), which was considered to have been already too specialized to be on a lineage leading to *Phaethon*. This record was somewhat anomalous geographically, as modern tropicbirds are usually found only within the tropics, an

exception being Bermuda, where warm waters of the Gulf Stream have permitted *Phaethon lepturus* to colonize. That the original specimen of *Heliadornis ashbyi* was not some aberrant wanderer from the south is now confirmed by the discovery of a second specimen from a much higher latitude on the opposite side of the Atlantic.

Phaethontidae

Heliadornis Olson 1985

Heliadornis ashbyi Olson 1985

Referred material.—Left humerus lacking the area of the internal tuberosity and bicipital crest and a few fragments of mid-shaft, BMNH A9005 (Figs. 1, 2). Collected in 1979 and presented in 1985 by Jacques Herman of the Service Géologique de Belgique.

Locality.—Belgium, Antwerp (Anvers) Province, Brussels-Antwerp motorway at the vicinity of the boundary between the communities of Berchem and Wilrijk. Service Géologique de Belgique site designation 28W126'.

Horizon.—At the base of the “Sables d’Anvers” or Sands of Antwerp, Middle



Fig. 1. Left humeri of tropicbirds in anconal view: A, *Phaethon aethereus* USNM 558044; B, *Heliadornis ashbyi* BMNH A9005, referred specimen from Belgium; C, *Heliadornis ashbyi* USNM 237226, holotype. Scale = 2 cm.



Fig. 2. Left humeri of tropicbirds in palmar view: A, *Phaethon aethereus* USNM 558044; B, *Heliadornis ashbyi* BMNH A9005, referred specimen from Belgium; C, *Heliadornis ashbyi* USNM 237226, holotype. Scale = 2 cm.

Miocene. The Anversian Sands fall somewhere within European Neogene land mammal stages (MN) 6 through 8 (Cheneval 1996). The sediments at the site are glauconitic sands with phosphatic concretions. The associated vertebrate fauna consists of rare cetaceans, frequent bones of teleosts, and abundant elasmobranchs.

Measurements (mm).—Measurements in parentheses are from the holotype of *H. ashbyi*. Total length, 97.3; distance from head to distal extent of pectoralis scar 31.2 (30.2); depth through head 5.1 (5.3); proximo-distal extent of bicipital intumescence 16.1 (16.0); width and depth of shaft at midpoint, 6.5 × 5.3 (6.4 × 5.3); distal width, 14.1; greatest diameter of brachial depression, 9.7; depth through external condyle, 8.2; greatest diameter of external condyle, 7.1.

Comparisons.—As far as they preserve portions in common, both the new specimen and the holotype of *Heliadornis ashbyi* are identical to one another and distinct from *Phaethon* in the manner outlined in the original diagnosis, especially in the great difference in the shape of the pectoral crest. Compared with *Phaethon aethereus*, which is the most similar in size (*P. rubricauda* is larger, *P. lepturus* smaller), the Belgian specimen of *Heliadornis* is somewhat larger with a straighter, more robust shaft. The distal end is wider because of the greater extension of the entepicondylar area, the brachial depression is wider and deeper, and the external condyle is shorter and more ovoid.

Discussion.—The age of the Belgian specimen appears to be almost exactly equivalent to that of the holotype of *Heliadornis ashbyi*, which came from Bed 11 of the Plum Point Member of the Calvert Formation and is thus earliest Middle Miocene (Langhian) in age (Ward 1992: figs. 2, 3). The Belgian specimen, coming from the base of the Anversian Sands, is possibly equivalent to MN 6, which is also at least partially Langhian in age (Steininger et al. 1989, fig. 1). In absolute terms, this was

approximately 14 million years ago. These specimens provide such a nice trans-Atlantic correlation that it is tempting to cite the ornithostratigraphy as evidence for the contemporaneity of the Calvert Formation and the Anversian Sands.

The holotype of *Heliadornis ashbyi* comes from just below 39° north latitude, whereas the Belgian specimen is from much higher, just above 51°N. Mlikovsky (1997) has described a second species in this genus, *Heliadornis paratethydicus*, based on an abraded proximal end of an ulna from the late Miocene at Brunn-Vösendorf, Austria, in a deposit that formed in the Paratethys Sea at about 48°N. This was referred to *Heliadornis* because it was generically distinct from *Phaethon* and considered a new species because it was larger than *H. ashbyi*. Thus *Heliadornis* was apparently a truly high latitude tropicbird, the scarcity of which is probably a reflection of strictly pelagic habits similar to those of modern tropicbirds of the genus *Phaethon*. In the Tertiary, the situation in tropicbirds may have paralleled that seen today in the Sulidae, in which gannets of the genus *Morus* are found in temperate waters at higher latitudes whereas boobies of the genus *Sula* occur in the tropics. *Heliadornis* may therefore have been the high latitude subtropical counterpart of the tropical *Phaethon*. The same factors, including the rigors of Pleistocene climates and the closing of the Panamanian seaway, that may have been responsible for the reduction in diversity of *Morus* from three species in the Calvert Formation to a single species in the North Atlantic today may also have brought about extinction in the higher latitude lineage of tropicbirds.

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